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ELECTRICAL ENGINEERING STANDARDS

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The All-Union Committee on Standards, Council of Ministers USSR, in 1947 - 1949 approved a number of electrical engineering standards, brief descriptions of which are given below. /This survey includes all EE standards approved since August 1947 except the standards on crane and metallurgical-type electric motors, norms for artificial lighting, and auto-tractor electrical equipment./

GOST 1494-49 - Electrical Engineering. Designations for Basic Quantities (letter). Replaces GOST 1494-42. Approved as recommended 1 April 1949.

The standard established letter designations for 62 basic quantities, (voltage, power, current, capacitance, self-inductance, resistance, etc.); it uses capital and small letters of the Latin and Greek alphabets. In cases where it is necessary to mark the difference between several quantities, or values of quantities, designated by one and the same letter, indexes are used and these are usually placed below (subscript). The following subscripts are accepted by the standard:

- a. Figures to denote ordinal numbers, e.g., to indicate the part of a circuit or individual components of the quantity designated,
- b. Small letters of the Russian alphabet, corresponding to the initial letters of the name of the process, state, etc., e.g., P_a is active power; P_k --apparent power, i.e., volt amperes.
- c. Letters of the Latin and Greek alphabets, where it is necessary to distinguish between concepts for which the basic letter designation is in a Latin or Greek letters, e.g., X_c --capacitive reactance; X_L --inductive reactance.

In exceptional cases, upper indexes may be used; these may be primes or Roman numerals.

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Instantaneous values of EMF, voltage, and current are represented by small letters, (e , u , i , respectively), and active (effective) values, as well as values for direct current, by capital letters, (E , U , I). Maximum values of these quantities during their harmonic variation are represented by the corresponding capital letters with the subscript "m" (Russian or Latin).

For designating complex expressions which vary in accordance with harmonic law, the standard recommends the use of a dot above the basic capital letter symbols.

For various quantities concerning different phases in polyphase systems, it is recommended that letter subscripts be used (i_a , i_e , i_c , or i_A , i_B , i_C). To represent quantities relating to the positive-, negative-, and zero-sequence symmetrical components of a polyphase system, the standard adopts the corresponding subscripts 1, 2, and 0.

GOST 4541-48 Machines, Electric. Designations for Over-all and Installation Dimensions. Replaces OST-4736. Approved 11 December 1948, effective on 1 July 1949.

The standard establishes letter designations for over-all and installation dimensions of DC and AC electric machines and units in dimensioned sketches, information folders, catalogues, etc. It provides symbols for 74 dimensions of electric machines and units. To denote these dimensions, six letters, capital and small, of the Latin alphabet are used with ordinal ^[sic] subscript numbers, namely: for length dimensions, (along the shaft) the letters "L" and "l"; for width (in the direction perpendicular to the shaft), the letters "B" and "b"; for heights, the letters "H" and "h"; for diameter, the letters "D" and "d"; for the distances between centers and axes, the letter "C"; for radius, the letter "R".

Dimensions for which the standard does not give symbols should be indicated by letters corresponding to the above, but with subscripts following the order given in the standard.

GOST 4542-48 - Electric Motors, Three-Phase, Induction, Scale of Powers. Approved 11 December 1948, effective 1 January 1949.

The standard establishes the following power scale for newly designed, three-phase general purpose induction motors, rated from one to 100 kilowatts, protected and enclosed, ventilated, intended for continuous duty from a 50-cycle line: 1, 1.7, 2.8, 4.5, 7, 10, 14, 20, 28, 40, 55, 75, 100 kilowatts.

GOST 4870-49 - Resistors, Starting and Regulating for Electric Motors of Industrial Installations. Approved 29 May 1949, effective 1 January 1950.

The standard applies to metallic resistors set up either separately, (resistance box) or built into the main circuit of DC and AC electric motors, with voltages up to 500 volts and nominal frequency up to 50 cycles, and intended for starting, braking, and regulating the speed of electric motors. The standard gives definitions of nominal currents (separately for starting and regulating resistors) and the starting current for the resistors. It establishes current scales in percent of nominal resistor current, a scale of the relative duration of each switch position, in percent (for starting-resistor steps) and a scale of contact duration for short-time duty (for special starting step-resistors).

The permissible temperature rise of the resistor above ambient temperature, 35 degrees centigrade according to the standard, should not exceed 350 degrees centigrade for heat-resistant alloys, in accordance with GOST 2238-43 and 2615-44, and cast iron, and not more than 300 degrees centigrade for Constantan and similar alloys. The deviation from the designed values of a resistor inserted

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in a circuit in a given position at a temperature of plus 20 degrees centigrade should not exceed plus or minus 10 percent for heat-resistant alloys and Constantan, and plus or minus 15 percent for cast iron. The resistor insulation should withstand a test voltage of 2,000 volts 50 cycles AC for one minute.

GOST 4871-49 - Rheostats, Starting and Starting-Regulating for DC Electric Motors for Industrial Installations. Approved 9 May 1949, effective 1 January 1950.

The standard applies to metallic DC rheostats with air-cooling and a flat-switching arrangement, intended either for starting only or for starting and speed control of DC electric motors up to 100 kilowatts, fed from a line voltage of not more than 500 volts. Rheostats are subdivided by the standard according to purpose, according to electrical protection (without electrical protection, with no protection, with minimum protection, with maximum protection, or with maximum-minimum protection), according to starting conditions for light or normal starting, and according to type of drive, with direct or remote control by manual devices. The standard establishes a scale of nominal voltages, a scale of starting currents, in percent of nominal current, in the first position of the rheostat, the number of starting steps, the magnitude of the voltage, or corresponding current, at which the protection should come into operation, the permissible temperature rise of the rheostat sections, the electrical insulating strength, and a number of other requirements.

GOST 4888-49 - Rheostats, Excitation. Approved 30 May 1949, effective 1 January 1950.

The standard applies to metallic rheostats (regulators) of excitation, used in industrial installations and at electric power stations, intended for regulating the voltage of DC and AC generators and to regulate the speed of DC electric motors when the voltage in the excitation circuit is not more than 500 volts. It establishes the limits and accuracy of voltage and speed regulation, the permissible temperature rise of the rheostat sections, electrical strength, and a number of other requirements.

GOST 5018-49 - Relays, Intermediate, Protective, Electromagnetic, GOST 5019-49 Relays, Signal, Electromagnetic. Approved 25 June 1949, effective 1 January 1950.

Standard 5018-49 applies to protective, electromagnetic, intermediate current and voltage relays for stationary installations actuated from DC or AC control circuits acting on electric circuits for protection, measurement, control, signaling, or the secondary circuits of instrument transformers. It covers high-speed and ordinary relays and also time-delay relays. The time of operation for high-speed relays should be not more than 0.02 seconds, and for ordinary relays, not more than 0.08 seconds. The relays should be produced in two models depending on the capacity of the contact system (with contacts of normal and increased capacity). The standard also provides for subdividing the relays according to type of contact system (with normally open, normally closed, reversing, or combined contacts), according to (1) whether an indicator of actuation is included, (2) the method used to return the moveable part to the initial position (relay with self-return or with forced return), (3) operating conditions for continuous or short-time duty, and (4) method of connecting the wires, (connection in front, connection behind, etc.).

Standard 5019-49 applies to electromagnetic signal voltage and current relays for stationary installations, actuated from AC or DC control circuits, intended to indicate the action of relay protection. It covers relays with a contact system whose actuating mechanism includes an indicator, and also relays with one or several contacts, and relays without a contact system, with only an operation indicator. The operation indicator should, in accordance with the standard, fall out when a current exceeding the actuation current by more than 20 percent flows through the relay for 0.05 seconds. Moreover, signal relays are

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subdivided according to the method of wiring, and according to the number of built-in elements in the housing (one or several relays in the housing).

Standards 5018-49 and 5019-49 establish the nominal voltages for which intermediate voltage relays should be made, (12, 24, 48, 110, and 220 volts DC, and 100, 127, 220 volts, 50 cycles AC), the permissible temperature rise of the current carrying parts of the relay, the electrical strength of the insulation, the values of the voltage and corresponding current at which reliable operation of the relay is guaranteed, and a number of other requirements.

According to the standards, the guaranteed period of reliable operation of intermediate and signal relays should be not less than 3 years from the day the relay leaves the factory, under conditions of storage, transportation, installation, and operation in accordance with the instructions of the manufacturing plant.

GOST 2366-49 - Insulators for Overhead Communication Lines. Replaces GOST 2366-43. Approved 21 January 1949, effective force 1 May 1949.

The standard applies to low-voltage insulators, Types TF-2, TF-3, TF-4, and TF-5 made from ceramics, intended for electrical insulation of overhead communication lines. It fixes the shape and dimensions of insulators, permissible tolerances, and requirements as to external appearance. The electrical resistance of insulators, according to the standard, should be not less than 10,000-50,000 megohms, depending upon the type of insulator, and the mechanical strength should be not less than 200-800 kilograms. The insulators should withstand heating in an air medium to 70 degrees centigrade and subsequent covering with water of a temperature not more than 20 degrees centigrade.

GOST 2825-49 - Resistors, Electric, Fixed, Nonwire. Scale of Nominal Values. Replaces GOST 2825-45. Approved 30 May 1949, effective 1 September 1949.

The standard establishes a scale of electrical, fixed nonwire resistors within the limits of 10 ohms to 10 megohms, with permissible deviations from the nominal of plus or minus 5, 10, or 20 percent, and more, and should serve as a basis for selecting nominal values for designing and manufacturing fixed, nonwire resistors.

GOST 2519-49 - Condensers, Electric, Scale of Nominal Capacitances. Replaces GOST 2519-44. Approved 13 May 1949, effective 1 September 1949.

The standard establishes a scale of capacitances for electric condensers of fixed capacitance within the limits of one micro microfarad to 2,000 microfarads with permissible deviation from the nominal of plus or minus 5, 10, or 20 percent, and more, with solid and liquid dielectrics, and should serve as a basis for selecting nominal values of capacitance when designing and manufacturing condensers.

GOST 3839-47 - Tubes, Electronic. Low-Power. Methods of Testing for Tube Life. Approved 27 August 1947, effective 1 January 1948.

The standard establishes the general procedure for testing electron receiving-amplifying tubes and low-power kenotrons, with a limiting permissible plate-power dissipation of not more than 20 watts. These tubes are intended mainly for use in radio receivers and amplifying devices.

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GOST 3895-47 - Batteries, Storage, Alkaline (Cadmium-Nickel).
GOST 3894-47 - Batteries, Storage, Alkaline (Cadmium-Nickel). Replaces OST
 NKTP 7822/594 through 7825/597. Approved 27 October 1947, effective 1 Jan-
 uary 1948.

The standards apply to individual alkaline (cadmium-nickel) storage-
 battery cells and, correspondingly, to batteries made from these cells,
 mounted in wooden boxes or frames. They establish the external appearance,
 dimensions, weight, electrical characteristics, and a number of other re-
 quirements for storage batteries and cells.

GOST 1882-47. Batteries, Storage, Alkaline (Cadmium-Nickel) for Portable
Lamps. Replaces GOST E-1882-42. Approved 27 October 1947, effective 1 Jan-
 uary 1948.

The standard establishes the external appearance, dimensions, weight,
 electrical characteristics, and a number of other requirements for two types
 of alkaline (cadmium-nickel) storage batteries, for portable lamps.

GOST 985-47. Cables, Electric, for Signaling and Blocking. Replaces GOST
 B-985-41. Approved 3 December 1947, effective 1 April 1948.

GOST 4376-48. Cables, Electric Control, with Copper Strands, With Insulation
of Impregnated Paper. Replaces OST NKTP 3507. Approved 14 September 1948,
 effective 1 January 1949.

The standards apply to cables with copper strands, insulated by impreg-
 nated cable paper, intended:

a. In accordance with GOST 985-47, for lines up to 250 volts in
 railroad signaling and blocking, fire signaling, telegraph, automatic devices,
 etc.

b. In accordance with GOST 4376-48, for connecting to electrical in-
 struments and apparatus in electrical distributing installations with nominal
 voltage up to 500 volts AC or 1,000 volts DC.

The standards cover cables in lead sheath: bare, Marks SOG and KSG; as-
 phalted, Marks SOA and KSA; armored with two steel bands, with an external
 covering of cable thread, Marks SOB and KSB; or covered with a compound or
 lacquer, Marks SOBG and KSBG; armored with flat galvanized steel wire, with an
 external coating of cable thread, Marks SOP and KSP, or without it, Marks SOPG
 and KSPG; armored with round galvanized steel wire, with an external coating of
 cable thread, Marks SOK and KSK. Mark SOG, SOA, SOB, etc., cables are manufac-
 tured in accordance with GOST 985-47, and Marks KSG, KSA, KSB, etc., in accord-
 ance with GOST 4376-48. The standards establish the number of current-carrying
 strands, thickness of rubber insulation, lead sheath, and protective coverings,
 requirements for protective coverings and for the materials used in making ca-
 bles, the insulation resistance, the electrical capacitance, and effective re-
 sistance of the cable strands, and the electrical strength of the insulation.

GOST 4604-49 - Cables for Peat Enterprises. Approved 11 January 1949, effective
 1 July 1949.

The standard applies to three-strand cables Mark GTSh, with copper strands,
 rubber insulation in a common rubber hose, used at peat enterprises at tempera-
 tures of minus 40 to plus 50 degrees centigrade, to connect movable machinery to
 electric lines. The standard establishes cross sections and the design of the
 current-carrying strands, the thickness of rubber insulation on the strands, the
 rubber covering and hose, the value of the test voltage, and a number of other
 requirements.

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GOST 3884-47 - Contacts of Silver and Cadmium Oxide. Approved 22 October 1947, effective 1 April 1948.

The standard applies to round contacts, for electrical AC and DC apparatus, made of silver and cadmium oxide by the metalloceramic method. It establishes two marks of contacts according to chemical composition and physical properties, an assortment of contacts according to sizes, and recommended values of nominal currents.

GOST 3836-47 - Steel, Low-Carbon, Electrotechnical, Thin-Sheet. Replaces OST 10006-38 in the part on material for electrical purposes. Approved 20 August 1947, effective January 1949.

The standard applies to low-carbon, electrotechnical steel, Marks E, EA, and EAA, with a thickness of 0.2 to 4 millimeters. It establishes the chemical composition of finished steel sheets, the values of coercive force, magnetic induction, and maximum magnetic permeability for steel sheets of each mark.

GOST 4268-48 - Mikalenta (Mica). Replaces GOST 2857-45 as regards Mikalenta. Approved 5 July 1948, effective 1 October 1948.

The standard applies to Mikalenta of Marks LMChI, LMSI, LFChI, LFSI, LMChII, LMSII, LFChII, and LFSII, used as electrical insulating material in electric machines and apparatus. In the symbol for the Mikalenta Mark, the first letter means Mikalenta, the second letter gives the type of mica (Muskovite or Phlogopite), the third letter gives the binding lacquer (Ch--oil-bituminous, S--oil-glyphtalic), I--Mikalenta with increased electric strength, II--normal. Mikalenta. Mikalenta is produced in rolls not more than 120 millimeters in diameter, 12 to 35 millimeters wide. The nominal thicknesses of Mikalenta are: 0.08, 0.10, 0.13, and 0.17 millimeters. The mean value of breakdown voltage of the electric field of Marks LMChI and LMSI, Mikalenta should be not less than 20 k_{eff}/mm , Marks LFChI and LFSI, not less than 18 k_{eff}/mm , Marks LMChII and LMSII, not less than 16 k_{eff}/mm , Marks LFChII and LFSII not less than 14 k_{eff}/mm . The standard also gives the limits of tensile strength of Mikalenta, depending on its thickness (from 3 to 1.8 kilogram per square millimeter and the characteristics of the materials of which Mikalenta is made.

GOST 4194 - Cardboard, Electrical Insulation. Mark EM. Approved 3 July 1948, effective 1 October 1948.

The standard applies to electrical insulating cardboard, Mark EM, produced in reels for thickness of 0.5 millimeters and in sheets for thickness over 0.5 millimeters, intended for duty in transformer oil at a temperature of up to 95 degrees centigrade. The standard fixes the thickness of the cardboard, (0.5, 1.0, 1.5, 2.0, 2.5, 3.0 millimeters), the tensile strength, the absorbing capacity for transformer oil, the mean breakdown voltage in transformer oil (from 47 to 19 k_{eff}/mm in relation to the thickness of the cardboard), and a number of other properties.

GOST 4248-48 - Boards, Asbestos-Cement, Electroinsulated, Nonimpregnated-Aceid. Approved 3 July 1948, effective 1 November 1948.

The standard applies to nonimpregnated asbestos-cement boards used to manufacture parts for electric machines and apparatus subjected to high temperatures and voltaic-arc (the walls of arc-quenching chambers, etc.) and also, after corresponding impregnation, for making panels, shields, and foundations for electrical apparatus. The standard provides for two marks of asbestos-cement boards, "300" and "400," with a bending strength in any direction not

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less than 300 and 400 kilograms per square centimeter. The standard establishes the tensile strength of asbestos-cement boards under shock bending, not less than 4.5 kilograms per centimeter per square centimeter the specific volumetric resistance, the mean breakdown voltage, and a number of other requirements.

GOST 4514-48 - Ribbons, Insulating, Cotton. Approved 4 December 1948, effective 1 February 1949.

The standard applies to cotton insulating tape, (twill, taffeta, calico, and cambric), used for insulating windings of electric machines and apparatus, and establishes the width, thickness, and physicomachanical properties of the tapes.

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